

BUTTON ASSEMBLY FOR INPUT DEVICES**CROSS REFERENCE TO RELATED APPLICATIONS**

[0001] This patent application is a continuation of U.S. patent application Ser. No. 09/802,449, entitled REVERSE CANTILEVER ASSEMBLY FOR INPUT DEVICES, filed Mar. 9, 2001 by Peter W. Johnson, the disclosure of which is hereby incorporated by reference for all purposes.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable.

REFERENCE TO MICROFICHE APPENDIX

[0003] Not Applicable.

BACKGROUND OF THE INVENTION

[0004] This invention relates to actuating mechanisms for hand or foot activated devices and more particularly to external buttons used to actuate electromechanical switches inside of computer pointing devices such as is what is commonly called a "computer mouse" and similar devices.

[0005] Pointing devices for controlling cursor movement and entering commands into a computer are well known in the art. Pointing devices typically include some sort of positioning element, such as a rotatable ball or photonic scanner in the device or a track ball manipulated by the hand. Additionally, there are typically one or more keys or "buttons" on the input device. A computer user selects actions (i.e. provides user input to the computer) by pressing ("clicking") a button after manipulating the positioning element. The external surface of the button and its associated internal components inside the device make up what is referred to as the button assembly.

[0006] The button assembly typically actuates an electronic switch that is electrically coupled to the computer. The button assembly usually has a spring-like character since its lever arm, usually made of molded plastic or other suitable material, is deformed when depressed by the finger, then returns to its undeformed or default position when the pressure from the finger is released. The electronic switch under the button assembly often consists of rigid plastic housing with a separate spring-loaded mechanical switch protruding from the top of the housing. When the button assembly is depressed and displaced by the force from the finger, the electronic switch moves and "clicks" when displaced the minimum required distance to actuate the switch.

[0007] A button assembly can be mechanically modeled as a plastic beam with a fulcrum on one end, this arrangement is known as a cantilever design. Many finger-actuated devices/switches on computer pointing devices employ some sort of cantilever design. However, not all computer users have the same size hand. Thus, it might be more difficult for some computer users, e.g. with short fingers, to actuate a button of a pointing device designed for users with longer fingers because their fingers do not reach sufficiently far onto the button.

[0008] Therefore, it is desirable to provide a computer pointing device with a button assembly design that accounts for differences in user hand size and strength.

SUMMARY OF THE INVENTION

[0009] A button assembly has a housing having a palm portion configured to fit a hand of a user. A spring beam having a first spring beam end and a second spring beam end is supportively attached to the palm portion of the housing with a first fulcrum so as to form a first cantilever beam extending away from the palm portion of the housing. A switch button having a first switch button end and a second switch button end is supportively attached at the first switch button end to the second spring beam end with a second fulcrum so that the switch button forms a second cantilever beam extending from the second fulcrum towards the palm portion of the housing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a simplified representation of a conventional mouse button and electronic switch.

[0011] FIG. 2 is a simplified representation of a mouse button and electronic switch according to an embodiment of the present invention.

[0012] FIG. 3 is a simplified partial cross section of a mouse with a reverse cantilever button according to an embodiment of the present invention.

[0013] FIG. 4 is a simplified top view of a button assembly inside a conventional trackball pointing device.

[0014] FIG. 5 is a simplified top view of a button assembly inside a trackball pointing device according to another embodiment of the present invention.

[0015] FIG. 6 is a simplified section of a trackball pointing device according to another embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS**[0016] 1. Introduction**

[0017] A computer pointing device with a reverse cantilever or reverse lever button assembly provides a button requiring decreasing force to actuate ("click") the electronic switch with decreasing distance from the palm portion of the device. This design allows users with smaller, and presumably weaker, hands/fingers, to more easily click the button, hopefully lowering the potential for fatigue and possible injury. In conventional button assemblies, a large-handed individual will activate the button assembly further away from the fulcrum compared to a small-handed individual. Due the nature of the cantilever design, it will take less force for the large-handed individual to activate the button assembly and electronic switch relative to the small-handed individual. This design may be contrary to the anatomical biomechanics related to stature and hand size. Smaller-handed and often weaker individuals are required to apply more force to the button assembly compared to the larger-handed and often stronger individuals.

[0018] 2. An Exemplary Computer Mouse

[0019] FIG. 1 is a simplified representation of a conventional mouse button 10 and electronic switch 12. Surrounding portions of the device are not shown for simplicity of illustration. The button assembly includes a fulcrum 14 about which the button moves in a slight arc, the external